SmartSwitch 9000
9G421-02/9G429-02
Gigabit Ethernet Interface Module
User's Guide

9032344-02

CABLETRON SYSTEMS

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Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Safety Information

CLASS 1 LASER TRANSCEIVERS

The 9G429-02 is a Class 1 Laser Product

The 9G429-02 uses a Class 1 Laser transceiver. Read the following safety information before installing or operating these adapters.

The Class 1 laser transceivers use an optical feedback loop to maintain Class 1 operation limits. This control loop eliminates the need for maintenance checks or adjustments. The output is factory set, and does not allow any user adjustment. Class 1 Laser transceivers comply with the following safety standards:

- 21 CFR 1040.10 and 1040.11 U.S. Department of Health and Human Services (FDA).
- IEC Publication 825 (International Electrotechnical Commission).
- CENELEC EN 60825 (European Committee for Electrotechnical Standardization).

When operating within their performance limitations, laser transceiver output meets the Class 1 accessible emission limit of all three standards. Class 1 levels of laser radiation are not considered hazardous.

Laser Radiation and Connectors

When the connector is in place, all laser radiation remains within the fiber. The maximum amount of radiant power exiting the fiber (under normal conditions) is -12.6 dBm or 55×10^{-6} watts.

Removing the optical connector from the transceiver allows laser radiation to emit directly from the optical port. The maximum radiance from the optical port (under worst case conditions) is 0.8 W cm^{-2} or 8×10^{3} W m^{2} sr-1.

Do not use optical instruments to view the laser output. The use of optical instruments to view laser output increases eye hazard. When viewing the output optical port, power must be removed from the network adapter.

Declaration of Conformity Addendum

Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG14 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

Manufacturer	Legal Representative in Europe
Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Compliance Engineer Manager	Managing Director - E.M.E.A.
Title	Title
Rochester, NH, USA	Newbury, Berkshire, England
Location	Location

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Chapter 1

Introduction

The 9G421-02/9G429-02 (Figure 1-1) is a Gigabit Ethernet interface module, occupying a single slot in the SmartSwitch 9000 chassis. Gigabit Ethernet networks are connected to the 9G421-02/9G429-02 through front panel ports. These ports interface with the switch through Gigabit Network Interface Blocks (GNIB) and are based upon an ASIC architecture.

The module connects to the Internal Network Bus (INB) B, providing a high speed backplane for communication among other modules in the SmartSwitch 9000 chassis. The 9G421-02/9G429-02 uses a SmartSwitch ASIC design and an advanced Intel i960® microprocessor providing a platform for all management functions within a scalable RISC-Based Architecture.

Network management information is available through a variety of methods. All information based on Simple Network Management Protocol (SNMP) is accessible either via an in-band (Front Panel port), Side Band (SMB-10), or via the Environmental Module's (EM) COM ports. Serial Line Internet Protocol (SLIP) or Point-to-Point Protocol (PPP) is supported by the EM COM ports. For more information on the SMB-10, SLIP or PPP refer to the SmartSwitch 9000 Local Management User's Guide.

The 9G421-02/9G429-02 features front panel LANVIEW® Diagnostic LEDs to offer at-a-glance status information about each front panel port as well as the operation of the overall module.

The 9G421-02 uses a shortwave 850 nanometer laser. The 9G429-02 uses a longwave 1300 nanometer laser. Follow applicable safety precautions to prevent injury.

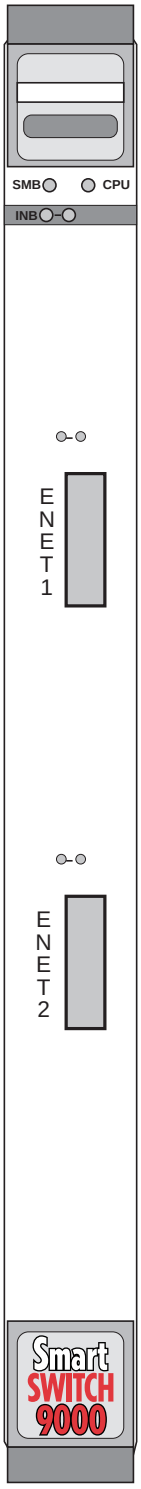


Figure 1-1. The 9G421-02/9G429-02 Module

Features

Processor

The 9G421-02/9G429-02 is equipped with an advanced Intel i960 microprocessor. This microprocessor provides a platform for all management functions, such as Spanning Tree, RMON, and MIB support within a scalable RISC-Based architecture.

Fast Packet Switching

The 9G421-02/9G429-02 incorporates a hardware-based switch design referred to as the SmartSwitch ASIC, a collection of custom ASICs designed specifically for high-speed switching.

Management

The 9G421-02/9G429-02 features SNMP for local and remote management. Local management is provided through the RS232 COM ports on the SmartSwitch 9000 Environmental Module using a standard VT220 terminal or emulator. Remote management is possible through Cabletron's SPECTRUM or any SNMP-compliant management tool. Included as management features are the IETF Standard Management Information Base (MIBs) RMON (RFC 1271), IETF MIB II (RFC 1213), IETF Bridge MIB (RFC 1493), and a host of other Cabletron enterprise MIBs. The 9G421-02/9G429-02 also offers the user a wide variety of statistical network management information to enhance network planning and troubleshooting. This module provides information for each front panel Ethernet Gigabit port, including packet counts along with errored frame information, such as collisions, CRCs, and Giants, via a variety of industry-standard and private MIBs. Industry standard IEEE 802.1d bridging, including the Spanning Tree Algorithm, is supported.

Connectivity

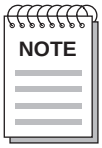
The 9G421-02 has one interface to the INB and two front panel multimode fiber (MMF) cables connecting to SC connectors. The INB interface is a fixed connection to the INB, allowing the 9G421-02 to communicate with other SmartSwitch 9000 modules supporting various LAN technologies including Token Ring, FDDI, Ethernet, WAN and ATM. Each front panel SC connector provides 1 Ethernet Gigabit connection. The 9G429-02 has one interface to the INB-B and two single mode fiber (SMF)/MMF SC connectors on the front panel of the module.

Management Information Base (MIB) Support

The 9G421-02/9G429-02 provides MIB support including

- RMON (RFC 1271)
- IETF MIB II (RFC 1213)
- IETF Bridge MIB (RFC 1493)

and a host of other Cabletron Enterprise MIBs.



For a complete list of supported MIBs, refer to the release notes provided in the 9G421-02/9G429-02 package.

LANVIEW LEDs

The 9G421-02/9G429-02 uses LANVIEW®, the Cabletron Systems built-in visual diagnostic and status monitoring system. With LANVIEW LEDs you can quickly identify system status, as well as the device, port, and physical layer status. Two LEDs indicate the transmission and reception of data from the INB SmartSwitch 9000 backplane connection. Each of the two Ethernet front panel ports feature two LEDs per port indicating the port's Administrative status (enabled/disabled), LINK status (Link/No link), and Data Activity (receiving and transmitting data).

Related Manuals

The Cabletron Systems manuals listed below may supplement the procedures and technical data contained in this manual.

- *SmartSwitch 9000 Installation Guide*
- *SmartSwitch 9000 9C300-1 Environmental Module User's Guide*
- *SmartSwitch 9000 9C214-1 AC Power Supply User's Guide*
- *SmartSwitch 9000 Local Management User's Guide*
- *INB Terminator Modules Installation Guide*
- *Ethernet Technology Guide*
- *Cabling Guide*

Getting Help

For additional support related to this device or document, contact Cabletron Systems using one of the following methods:

World Wide Web	http://www.cabletron.com/
Phone	(603) 332-9400
Internet mail	support@cabletron.com
FTP Login Password	ftp://ftp.cabletron.com/ *anonymous* *your email address*
To send comments or suggestions concerning this document, contact the Cabletron Systems Technical Writing Department via the following email address: **TechWriting@cabletron.com** *Make sure to include the document Part Number in the email message.*	

Before calling Cabletron Systems, have the following information ready:

- Your Cabletron Systems service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Cabletron Systems products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

Chapter 2

Installation

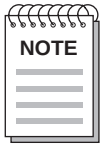
This chapter describes the physical layout of the 9G421-02/9G429-02 module and explains preparation and installation procedures for use in a SmartSwitch 9000 chassis. The 9G421-02/9G429-02 occupies a single slot in the SmartSwitch 9000 chassis. Install the 9G421-02/9G429-02 by following the steps in **Unpacking the Module** below.

Only qualified personnel should perform installation procedures.

Never expose the module's components to Electrostatic Discharge. Make sure you have attached the module's disposable grounding strap to your wrist and always place the module on a non-conductive surface.

Tools Needed

- Phillips screwdriver



The INB Terminator modules must be installed on the rear of the chassis before powering up this module. Refer to the ***INB Terminator Modules Installation Guide*** *for the installation procedure. The INB Terminator modules are essential to the proper operation of the bus on the chassis.*

Unpacking the Module

1. Carefully remove the module from the shipping box. (Save the box and packing materials in the event it must be reshipped.)
2. Remove the module from the plastic bag. Observe all precautions to prevent damage from Electrostatic Discharge (ESD).
3. Carefully examine the module, checking for damage. If any damage exists, DO NOT install the module. Contact Cabletron Systems immediately.

Physical Layout

The 9G421-02/9G429-02 has two major circuit boards on which components are attached (see Figure 2-1). The base-level circuit board is known as the motherboard and the second-level circuit board is known as the daughterboard. The removable daughterboard attaches to the motherboard with connectors and standoffs. Both the motherboard and the daughterboard contain components accessible to the user.

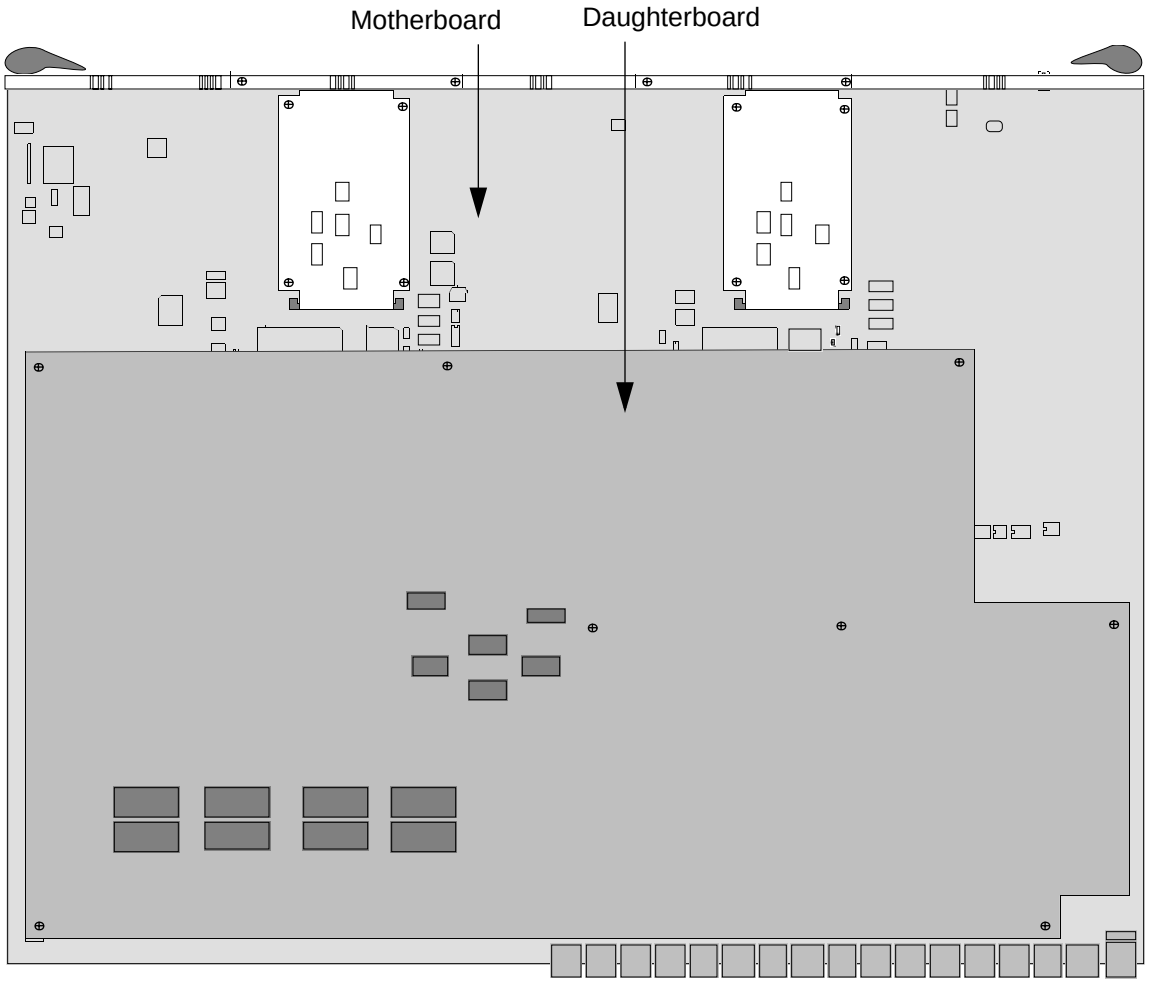


Figure 2-1. The 9G421-02/9G429-02 Circuit Boards

User Accessible Daughterboard Components

The user accessible components are located on the underside of the daughterboard. These components include an eight-position DIP switch, a replaceable SMB-1 PROM, a replaceable BOOT PROM, and sockets for DRAM and FLASH memory. **You can access the DIP switch without removing the daughterboard.** However, to access the other components on the daughterboard, you must remove the daughterboard from the motherboard.

DIP Switch

The daughterboard eight-position DIP switch location is shown in Figure 2-2. The switch functions are described in Table 2-1.

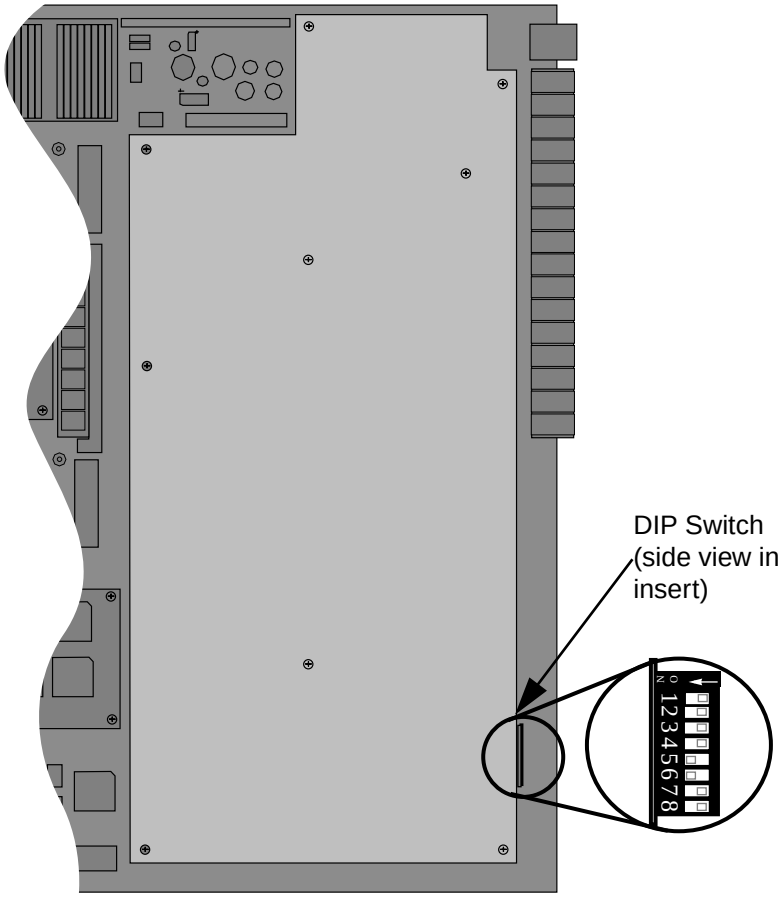


Figure 2-2. 9G421-02/9G429-02 Daughterboard DIP Switch Location

Table 2-1. Function of DIP Switch

Switch	Function	Description
8	Clear Password [1]	When toggled, this switch clears user-entered passwords stored in NVRAM, and restores the default passwords. Once the passwords are reset, you can use the defaults or enter new passwords.
7	Clear NVRAM [2]	The module uses NVRAM to store user- entered parameters such as IP addresses, device name, etc. To reset these parameters to the factory defaults, toggle this switch. Once reset, you can use the defaults or enter new parameters, which are stored in NVRAM when the module is powered down, and remain there until the switch is toggled again.
6	Force BootP Download	Toggling this switch, after pulling the board out of the SmartSwitch 9000, clears download information from NVRAM. It also forces image files to be downloaded from the station connected to the EPIM on the Environmental Module, which is configured to act as that module's BOOTP server.
5	Reserved	For Factory Use Only
4	Reserved	For Factory Use Only
3	Reserved	For Factory Use Only
2	Reserved	For Factory Use Only
1	Reserved	For Factory Use Only

[1]Do not toggle Switch 8 unless you intend to reset the user-entered passwords to the factory default settings.

[2]Do not toggle Switch 7 unless you intend to reset the user parameters to the factory default settings.

Removing the Daughterboard from the Motherboard

Perform the following steps to remove the daughterboard:

1. Place the module (component side up) on a non-conductive, flat surface with the front (faceplate) to the left. The daughterboard abuts the backplane connectors (see Figure 2-1).
2. Locate the nine screws as shown in Figure 2-3.

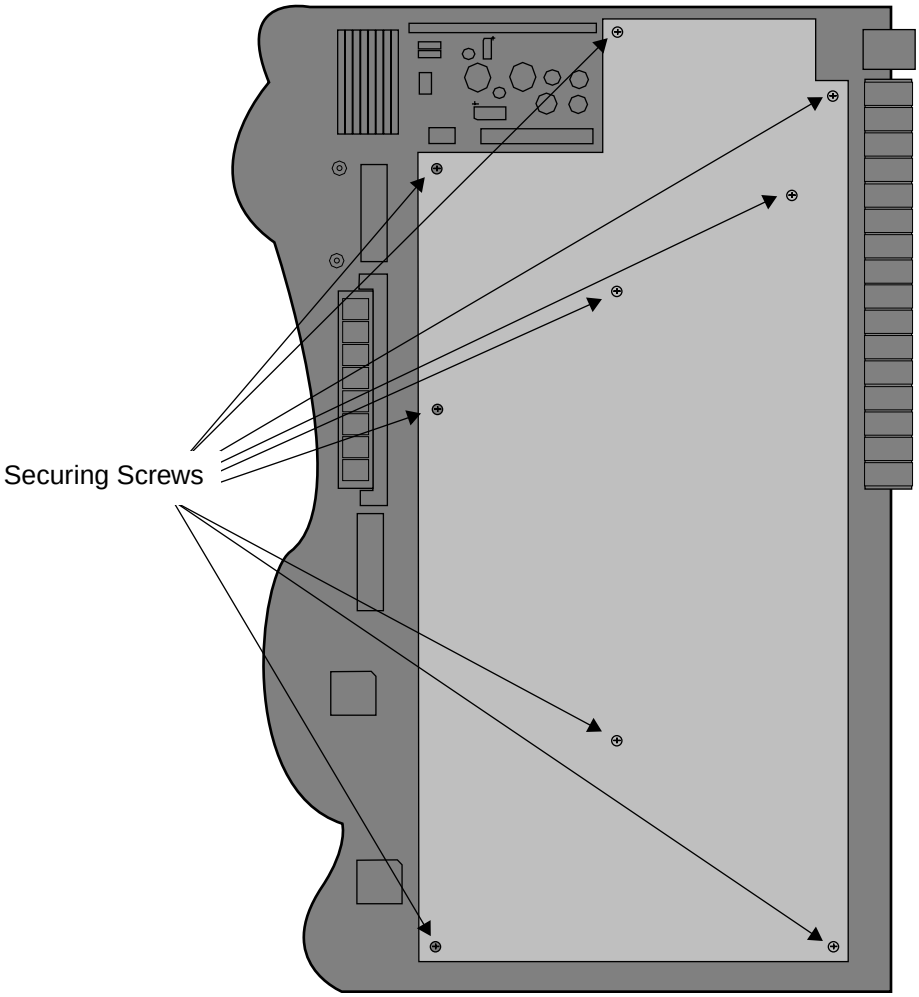


Figure 2-3. Daughterboard Attached to the 9G421-02/9G429-02

3. Use a Phillips screwdriver to remove the screws and set the screws aside.
4. Carefully grasp the daughterboard and lift up.
5. Turn the daughterboard over to reveal the user-accessible components illustrated in Figure 2-4.

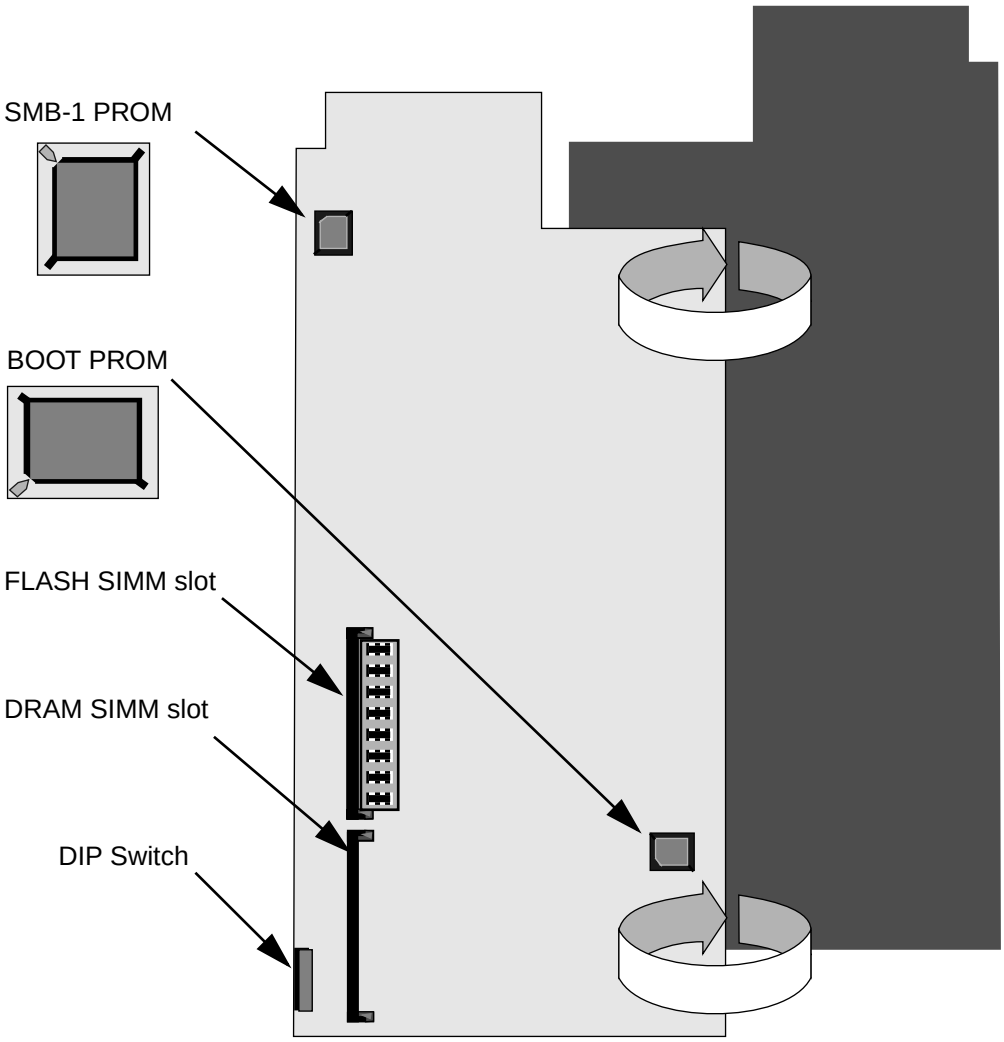


Figure 2-4. User-Accessible Components on Underside of 9G421-02/9G429-02 Daughterboard

Daughterboard Components

SMB-1 PROM

The 9G421-02/9G429-02 is shipped with an SMB-1 Firmware PROM located on the underside of the daughterboard as shown in Figure 2-4.

To upgrade the SMB-1 PROM, refer to the SMB-1 PROM Upgrade Kit instructions.

BOOT PROM

The 9G421-02/9G429-02 is shipped with a BOOT PROM located on the underside of the daughterboard as shown in Figure 2-4.

To upgrade the BOOT PROM, refer to the BOOT PROM Upgrade Kit instructions.

FLASH SIMM

The 9G421-02/9G429-02 is shipped with a 4 MB FLASH SIMM located on the underside of the daughterboard as shown in Figure 2-4.

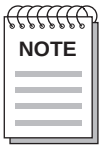
To upgrade the FLASH SIMM, refer to the installation instructions included in the FLASH SIMM Upgrade Kit.

DRAM SIMM

The 9G421-02/9G429-02 is shipped with 16 MB of DRAM located on the motherboard. However if additional DRAM is desired, you can install a DRAM SIMM in the socket on the underside of the module's daughterboard as shown in Figure 2-4.

To install a DRAM SIMM, refer to the installation instructions included in the DRAM SIMM Upgrade Kit.

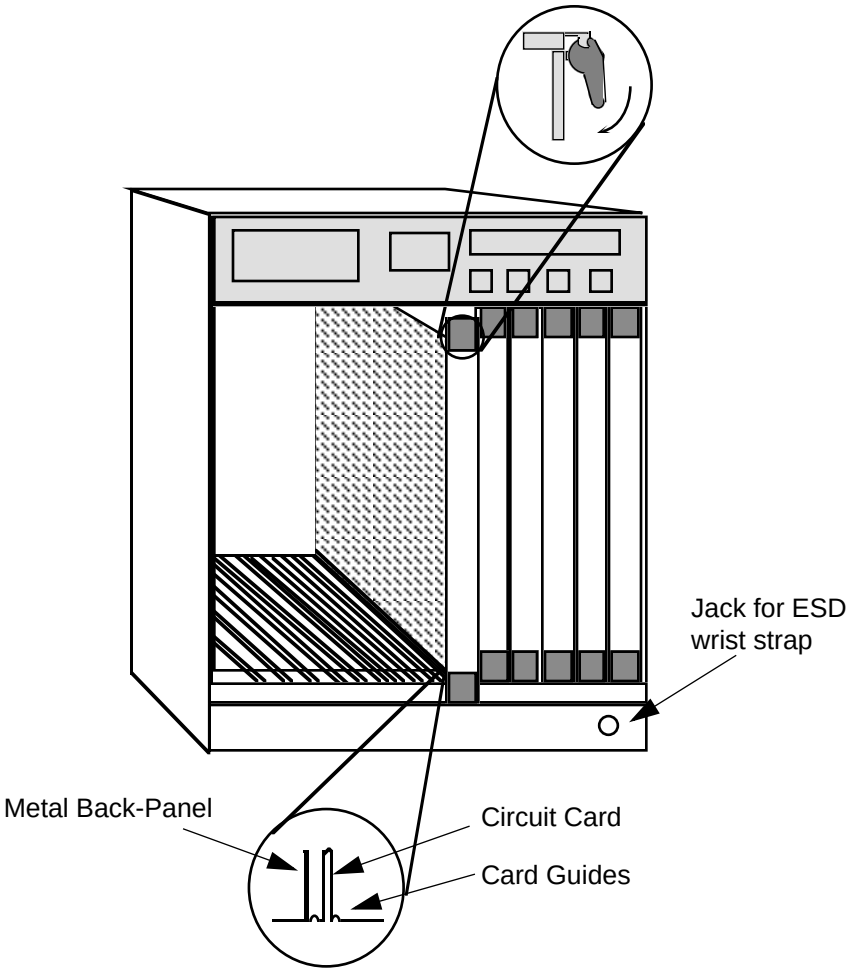
Installing the Module into the SmartSwitch 9000 Chassis



To insure proper data transmission from the 9G421-02/9G429-02 module to the INB on the SmartSwitch 9000 backplane, two INB Terminator modules must be installed on the rear of the SmartSwitch 9000 chassis. If they have not previously been installed, refer to the ***INB Terminator Module Installation Guide*** *for information and installation procedure.*

To install the 9G421-02/9G429-02 module into the SmartSwitch 9000 chassis, follow these steps:

1. Remove the blank panel covering the slot in which you will install the module. If you are only installing one module, make sure the other module slots are covered. This action ensures proper airflow and cooling.
2. Attach one end of the ESD wrist strap (packaged with the SmartSwitch 9000 chassis) to your wrist. Plug the other end into the ESD Wrist Strap grounding receptacle in the lower right corner of the SmartSwitch 9000 chassis shown in Figure 2-5.
3. Grasp the module and slide it into the slot. Make sure that the module's circuit card is between the card guides, as shown in Figure 2-5. Check both the upper and lower tracks of the card. Make sure that the module slides in straight and engages the backplane connectors properly.
4. Lock down the top and bottom plastic tabs, as shown in Figure 2-5.



Warning:
Ensure that the circuit card is between the card guides.
Lock down the top and bottom plastic tabs
at the same time, applying even pressure.

Figure 2-5. Installing the 9G421-02/9G429-02 Module

The Reset Switch

The Reset switch is located under the top plastic tab, as shown in Figure 2-6. Use the reset switch to reset the module's processor, shutdown (power down) the module, and/or restart the module.

- To reset the module's i960 processor, press the reset switch twice within three seconds.
- To shut down the module, press and hold the reset switch for three or more seconds.
- To restart the module, press the reset switch momentarily.

SNMP management may be used to disable this switch to enhance module security.

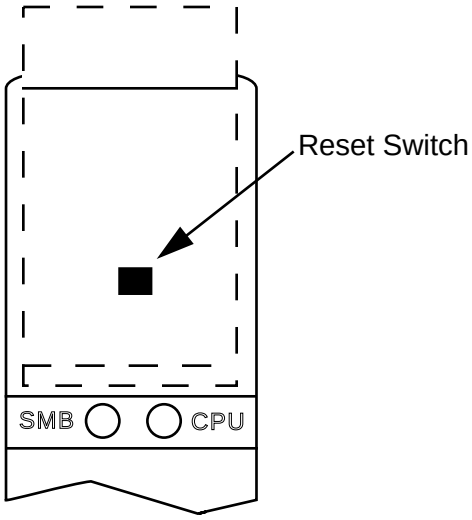


Figure 2-6. The Reset Switch

Chapter 3

Operation

The 9G421-02/9G429-02 module is a two-port Gigabit Ethernet device. Two front panel gigabit fiber optic ports provide connectivity through SC connectors.

As shown in Figure 3-1, Gigabit Network Interface Blocks (GNIBs) convert data packets received from the gigabit optics port into a canonical frame format before forwarding to the SmartSwitch ASIC. The Internal Network Bus Network Interface Block (INB NIB) converts data packets received from the INB into a canonical format before forwarding to the SmartSwitch ASIC.

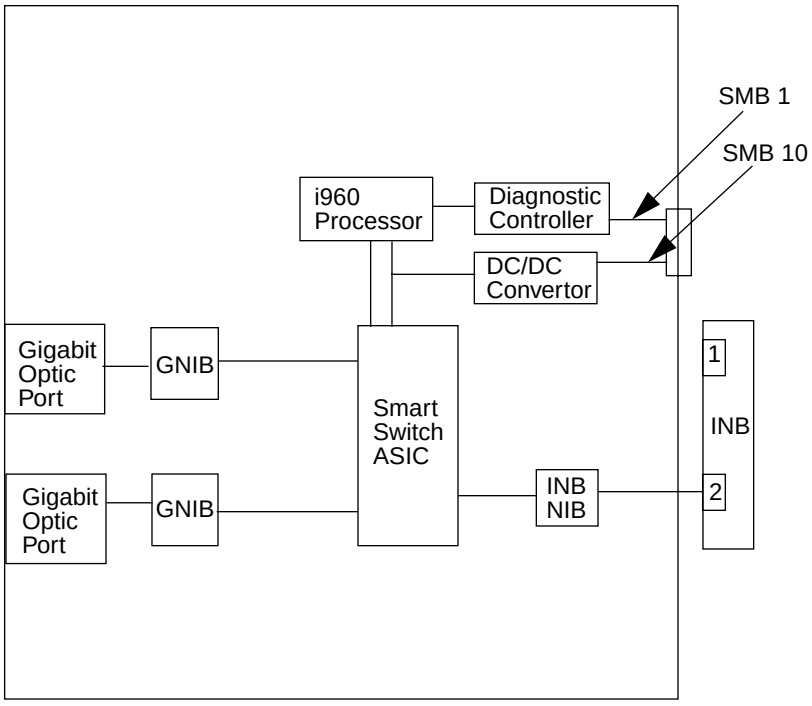


Figure 3-1. GNIB Packet Flow

System Management Buses

There are two management channels within the SmartSwitch 9000 system: the SMB-1 and the SMB-10. These buses provide side-band management and inter-module management communication.

SMB-1 Bus

The SMB-1 is a 1 Mbps management bus located within the SmartSwitch 9000. This bus is utilized by all diagnostic controllers in the system, including connectivity modules, power supply modules and the environmental module. The SMB-1 transports inter-chassis information between system components, such as power and environmental information, as well as diagnostic messages. Periodic loop-back tests are performed by all modules that share this bus to ensure the validity of SMB-1. In the event a failure is detected on SMB-1, the SMB-10 may be used as an alternate communication channel.

SMB-10 Bus

The SMB-10 is a 10 Mbps management bus located within the SmartSwitch 9000. This bus is used for inter-chassis communication of modules as well as serving as a side-band management channel into the SmartSwitch 9000. The SMB-10 is externalized from the chassis via an optional Ethernet Port Interface Module (EPIM) located on the front of the Environmental Module. Through an EPIM connection, full-SNMP management of the SmartSwitch 9000 is available out-of-band from user data. Modules that share the SMB-10 bus periodically send out loop-back packets to ensure the validity of SMB-10. If a fault is detected on the SMB-10, the SMB-1 can be used as an alternate communication channel by the modules.

System Diagnostic Controller

This diagnostic controller is composed of a Z-80 microprocessor and its supporting logic. The diagnostic controller is designed to control the power-up sequencing of modules, monitor the 9G421-02/9G429-02 input and output power parameters, keep watch over the main host processor, monitor the temperature, and control the SMB LANVIEW diagnostic LEDs. Although the system diagnostic controller and the main host processor can operate independently of each other if needed, they exchange status information and overall module condition. The information gathered by the diagnostic controller is available to the network manager via local/remote management and the LCD located on the environment module. The 9G421-02/9G429-02 is designed to continue functioning in the event of a diagnostic controller fault.

DC/DC Converter

The DC/DC converter converts the 48 VDC on the system power bus to the necessary operating voltages for its host network services module. The diagnostic controller monitors and controls the operation of the DC/DC converter.

INB Interface

Each module attaches to both INB A and INB B and has two INB Network Interface Block's (NIB). The INB NIBs convert canonical frames to fixed length data blocks for transmission onto the INBs. For data blocks received from either INB, the INB NIB reassembles the data blocks received from the INB back into canonical frames for transmission back through the switching fabric to the front panel ports.

SecureFast SmartSwitch Architecture

The SecureFast SmartSwitch Architecture of the 9G421-02/9G429-02 module is configurable for one of two modes of operation: traditional switching (bridging), or SecureFast switching. The module supports only one of these modes of operation at any one time.

When operating in traditional switch mode, the 9G421-02/9G429-02 makes filtering/forwarding decisions based on Destination Address (DA), with standard IEEE 802.1D learning. Spanning tree operation for the 9G421-02/9G429-02 is configurable to adhere to IEEE 802.1D, DEC, or none. The default Spanning Tree Algorithm is 802.1D.

When operating in SecureFast switching mode, all filtering/forwarding decisions are made on a DA-SA pair and its receive port. SecureFast switching mode provides value-added network services including Topology, Connectivity, IP Multicast, Control, Security, Application, Address Management, Dynamic Mapping, and Directory services. For example, Topology Services included configurable options ranging from simple spanning tree implementations to fully-meshed active topologies. Other services and features supported in SecureFast switching mode are described in detail in the Cabletron White Paper, **IP Host Communication in Bridged, Routed and SecureFast Networks**.

i960 Core

The i960 core supports a high-speed, software-based look-up function involved in performing filtering/forwarding decisions on incoming data frames. In addition, the i960 core provides the SNMP protocol stacks, to support industry standard MIBs, as well as Cabletron enterprise extension MIBs for each media type. Management services, such as telnet and network address to MAC address mapping, are also provided by the i960 core.

Chapter 4

LANVIEW LEDs

The front panel LANVIEW LEDs indicate the status of the module and may be used as an aid in troubleshooting. Figure 4-1 shows the 9G421-02/9G429-02 Module LANVIEW LEDs.

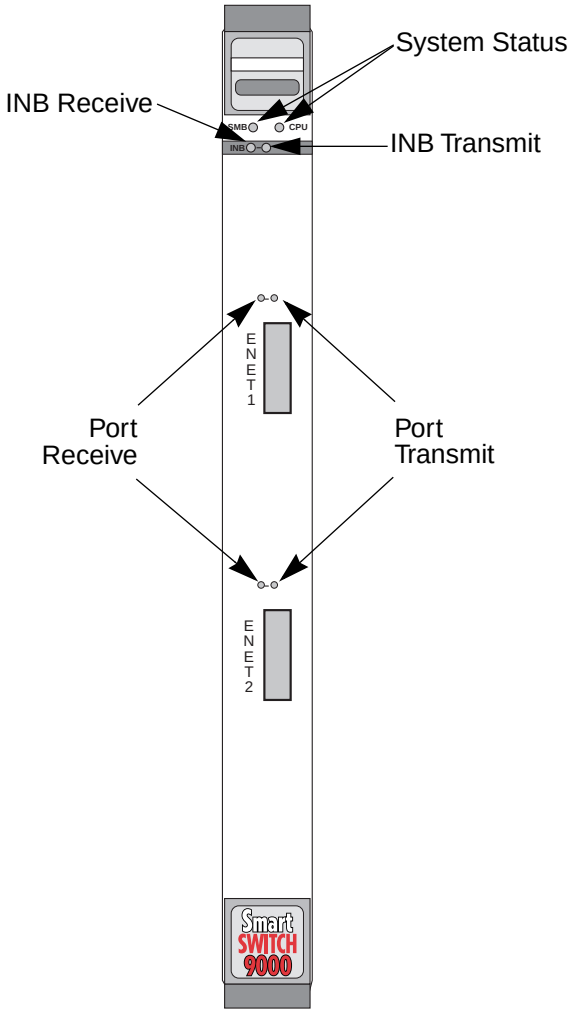


Figure 4-1. The LANVIEW LEDs

Table 4-1 lists the states of the two System Status LEDs (System Management Bus (SMB) and Central Processing Unit (CPU).

Table 4-1. System Status (SMB and CPU) LEDs

LED Color	State	Description
Green	Functional	Fully operational
Yellow	Testing	Power up testing
Yellow (Flashing)	Crippled	Not fully operational (i.e., one port may be bad)
Yellow/Green	Booting	Module is performing its boot process
Red	Reset	Module is resetting
Red (Flashing)	Failed	Fatal error
Off	Power off	Module powered off

Table 4-2 lists the states of the INB Receive LED.

Table 4-2. INB Receive LED

LED Color	State
Green	Link, no activity, port enabled
Green (Flashing)	Link, port disabled
Yellow (Flashing)	Link, activity, port enabled
Red	INB fault (not synchronized with the INB bandwidth arbitrator)
Off	No link, no activity (port enabled)

Table 4-3 lists the states of the INB Transmit LED.

Table 4-3. INB Transmit LED

LED Color	State
Green (Flashing)	Activity, port enabled
Yellow (Flashing)	Port in standby state
Red	INB fault
Red (Flashing)	Fault or Error
Off	No activity (port enabled)

Table 4-4 lists the states of the Port Receive LED.

Table 4-4. Port Receive LED

LED Color	State
Green	Link, no activity, port enabled
Green (Blinking)	Link, port disabled
Yellow (Flashing)	Link, activity, port enabled
Red	Fault - Diagnostic (Hardware) Failure
Off	No link (port disabled or enabled)

Table 4-5 lists the states of the Port Transmit LED.

Table 4-5. Port Transmit LED

LED Color	State
Green (Flashing)	Data activity, port enabled
Yellow (Blinking)	Port in standby state
Red (Flashing)	Collision (rate of flashing indicates collision rate)
Red	Fault - Diagnostic (Hardware) Failure
Off	No activity, port can be disabled or enabled

Appendix A

Specifications

Technical Specifications

CPU

Intel i960 RISC based microprocessor

Memory

4 MB	Flash Memory (expandable to 16 MB)
2 MB	Packet RAM
16 MB	DRAM (expandable to 48 MB)

Network Interfaces

9G421-02: MMF SC Connectors

9G429-02: SMF or MMF cable to SC connectors

Regulatory Compliance

It is the responsibility of the person who sells the system to which the module will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

This equipment meets the Safety requirements of:

- UL 1950
- CSA C22.2 No. 950
- EN 60950
- IEC 950

EMI requirements of:

- FCC Part 15 Class A
- EN 55022 Class A
- VCCI Class I

EMC requirements of:

- EN 50082-1
- IEC 801-2 ESD
- IEC 801-3 Radiated susceptibility
- IEC 801-4 EFT

Service

MTBF for the 9G421-02:

96,708 hours	calculated
614,098 hours	field

MTBF for the 9G429-02:

93,113 hours	calculated
377,056 hours	field

MTTR:

<0.5 hour

Physical

Dimensions

35.0 D x 44.0 H x 3.0 W centimeters

(13.8 D x 17.4 H x 1.2 W inches)

Weight

Unit:	1.36 kg (3 lb.)
Shipping:	1.82 kg (4 lb.)

Environment

Operating Temperature:	5° to 41° C (41°to 104° F)
Storage Temperature:	-30° to 73° C (-22°to 164° F)
Operating Humidity:	5% to 90% (relative humidity)